

 Alleima

# Precision strip steel

to push your  
possibilities

Find out more at  
[alleima.com](https://www.alleima.com)

# Setting new standards in precision strip steel

100 years of experience behind us. Unlimited product and process development opportunities ahead of us. Just two reasons why Alleima is the precision strip steel manufacturer of choice for the world's most demanding industries. Using the most advanced technology in steel processing we secure critical material properties in each step from melt to final strip product. Always with complete metallurgy control.

Alleima is the world-leading manufacturer of high-quality stainless, carbon and high-alloy steels. Our facilities, located in the most strategic global markets, produce strip steel in a wide range of steel grades with excellent properties in terms of corrosion resistance, strength, workability, suitability for use at high temperatures and more. We continuously work in close partnerships with our customers on innovations and solutions for many tailor-made demanding applications.

With full metallurgy control, we are more than able to meet the most specific customer demands for special steel properties. Our cold rolling mills can produce strip in thicknesses down to 0.015 mm (0.0006 inches) with tolerances down to  $\pm 0.001$  mm (0.00004 inches). And with fully integrated manufacturing processes, we guarantee the close controls necessary for a superior quality and reliability.





# Precision for productivity

Unlock new possibilities and higher productivity by partnering with Alleima.

## Expertise

With long experience and recognized industry know-how, let us guide you to the right material choice and processing steps for your application. Help yourself to our expert technical advice online or through our sales team.

## Tailor made

Collaboration is our favorite way to work. With a vast range of material grades, sizes and specifically developed solutions, we'll work together to meet your most unique needs.

## Consistency

Reliable quality, every time. Consistency comes as standard at Alleima, thanks to full quality assurance and intricate control of the entire manufacturing process.

## Value

Realize sustainable value streams. Recycled Alleima materials have a lower CO2 footprint than competitor materials, giving your products the sustainable edge.

## Accessible

A convenient global network of support and sales teams. Comprehensive online resources. Partnering with us means always-on accessibility.

[alleima.com](http://alleima.com)

# Valves for compressors and shock absorbers

How do compressor valves perform consistently under the most stressful conditions? The secret is in the steel. Advanced Alleima metallurgical processes ensure that critical inner- and outer properties of the material are combined to offer optimal fatigue resistance.

Compressor valve strip is supplied in hardened and tempered condition, both in stainless martensitic chromium and carbon steel.

Alleima compressor valve strip products are characterized by high levels of:

- fatigue- and wear resistance
- flatness
- surface quality
- blankability

A wide range of applications rely on valves made from Alleima strip steel, including:

- refrigeration and freezing
- air conditioning
- heat pumps
- air brake compressors
- industrial compressors
- cryogenic applications
- respiratory / oxygen devices
- shock absorber shims

ALLEIMA GRADE	TENSILE STRENGTH		THICKNESS	
	MPa	ksi	mm	inch
<b>Martensitic Stainless Chromium Steel</b>				
Freeflex™	2020	293	0.076-0.600	0.0003-0.024
Hiflex™	1900	279	0.060-1.0	0.0024-0.039
Alleima® 7C27Mo2	1800	261	0.102-1.2	0.004-0.047
<b>Carbon Steel</b>				
Alleima® 20C	1600-2100	232-305	0.102-1.2	0.004-0.047

# Edge and shaving applications

When sharp, corrosion-resistant edges are essential, Alleima martensitic stainless chromium steel delivers. This fine-grained homogeneous and decarburization-free structure provides the optimum hardening properties necessary for the reliable, high-performance razor blades.

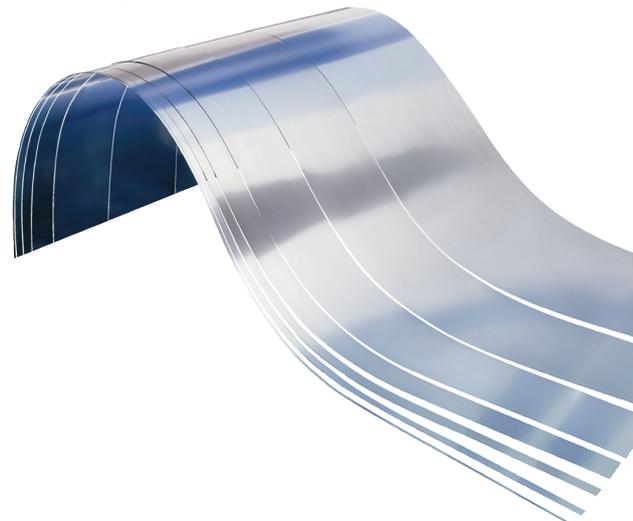
Choose from a range of hardenable stainless chromium steel in our standard product portfolio, each with a unique combination of hardness and corrosion-resistant properties.

Besides used for razor blades, Alleima strip is also an essential component in multiple types of professional and domestic kitchen knives, butcher's knives, hunting, fishing and hobby knives, scissors, electrical shaver heads and even ice-skate blades.

Our latest addition to our knife steel product portfolio is Damax™ – multilayered Damascus steel, made with up to 135 layers with martensitic stainless steel. The steel grades in Damax™ are Alleima® 7C27Mo2 and Alleima® 19C27.

Please find hardening recommendations for our knife steel at [www.alleima.com/hardening-guide](http://www.alleima.com/hardening-guide)

ALLEIMA® GRADE	TENSILE STRENGTH		THICKNESS	
	MPa	ksi	mm	inch
<b>Precipitation Hardenable Steels</b>				
Nanoflex™	950-1850	138-268	0.015-2	0.0006-0.08
<b>Martensitic Stainless Chromium Steels</b>				
Alleima® 6C27	600-1000	87-145	0.1-2.5	0.004-0.098
Alleima® 7C27Mo2	700-1000	102-145	0.1-4.5	0.004-0.177
Alleima® 12C27M	700-1000	102-145	1.0-4.5	0.04-0.177
Alleima® 12C27	700-1000	102-145	1.0-4.5	0.04-0.177
Alleima® 13C26	700-1100	102-160	0.074-3.0	0.0029-0.118
Alleima® 19C27	700-1100	102-145	0.1-3.0	0.004-0.118
Alleima® 14C28N	700-1000	102-145	0.1-4.5	0.004-0.177
Alleima® 10C28Mo2	700-1100	102-160	0.074-4.0	0.0029-0.158
Damax™	700-1000	102-145	2.5-4.0	0.098-0.158



# Spring applications

What constitutes the perfect spring? Of course, it needs to provide the required spring force. It should be reliable, functioning in demanding environments. Preferably over a long life. And ideally, it will be easy to manufacture. All these characteristics rely on material formability. And that relies on Alleima strip steel.

Explore our wide range of strip steel for the manufacture of coiled and formed springs, available in both stainless and carbon steel grades.

## Austenitic and duplex stainless steels

Even the most demanding applications can be met with the Alleima strip steel range. Different requirements on strength, relaxation resistance, fatigue strength, corrosion resistance and ductility are satisfied by our multi-grade, performance and dimension product program.

Extremely thin strip production (down to 0.015 mm or 0.0006 inches) with high strength (up to 2050 MPa, 297 ksi) and very close thickness tolerances (down to  $\pm 0.0015$  mm or 0.00004 inches) is an Alleima specialism.

To assist your forming needs, strip can be delivered in a relatively soft condition. This is particularly useful for spring manufacturing involving severe forming or where a low springback is necessary.

A simple tempering heat treatment is also available, increasing spring steel strength by 50–800 MPa (7–116 ksi), depending on material grade and initial tensile strength.

## Martensitic stainless chromium steel and carbon steels

When springs demand exceptional flatness, hardened and tempered stainless chromium steel is recommended. If corrosion resistance is not a factor, carbon steel strip can also be a viable alternative.

As round edges can notably improve strip fatigue life, Alleima stainless steel for springs is available with shaved rounded profile.

ALLEIMA® GRADE	TENSILE STRENGTH		WIDTH		THICKNESS	
	MPa	ksi	mm	inch	mm	inch
<b>Austenitic Stainless Steels</b>						
Alleima® 12R11	800–1900	116–276	2–345	0.08–13.6	0.015–3	0.0006–0.12
Alleima® 11R51	1700–2050	247–297	2–345	0.08–13.6	0.015–1.5	0.0006–0.06
Alleima® 13RM19	850–1600	123–232	2–345	0.08–13.6	0.015–3	0.0006–0.12
Alleima® 2RK65HV	650–1200	94–174	2–270	0.08–10.6	0.015–3	0.0006–0.12
<b>Precipitation Hardenable Steels</b>						
Alleima® 9RU10	1200–1700	174–247	2–360	0.08–14.2	0.015–3	0.0006–0.12
Nanoflex™	950–1850	138–268	2–330	0.08–13	0.015–2	0.0006–0.08
<b>Duplex Stainless Steels</b>						
Springflex™	1100–1700	160–239	2–300	0.08–11.8	0.03–3.5	0.0012–0.14
SAF™ 2507	900–1600	131–232	2–300	0.08–11.8	0.015–4	0.0006–0.016
SAF™ 3207HD	1000–1800	145–261	2–300	0.08–11.8	0.015–3.5	0.0006–0.14
<b>Ni-Base Alloy</b>						
Sanicro® 75X	750–1350	109–196	2–200	0.08–7.9	0.015–4	0.0006–0.16
<b>Martensitic Stainless Chromium Steel</b>						
Alleima® 7C27Mo2	1700–1800	247–261	2–350	0.08–13.8	0.08–1.5	0.002–0.06
<b>Carbon Steels</b>						
Alleima® 20C	1600–2100	232–305	2–360	0.08–14.2	0.076–1.4	0.003–0.06

# Medical applications

The medical field puts extremely tough demands on stainless steels. Alleima advanced strip steel meets them all.

Alleima 7C27Mo2 is a martensitic stainless chromium strip steel with particularly high corrosion resistance, toughness and fatigue properties. These characteristics make it a perfect choice for blades in surgical power tools. This strip steel can be supplied hardened and tempered or annealed.

For applications such as scalpels, surgical blades, where high hardness, edge retention and corrosion resistance are essential, Alleima 13C26 is the natural choice. And for implant applications Alleima 316LVM is a

metallurgical refined product offering with excellent purity, corrosion resistance and mechanical properties. It is a specially tailored strip steel where a vacuum re-melting process together with strict chemical control produces a high purity product with good mechanical properties and corrosion resistance.

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#### ALLEIMA® GRADE

Austenitic And Duplex Stainless Steels And Ni-Base Alloys

Alleima® 316LVM

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#### Martensitic Stainless Chromium Steels

Alleima® 7C27Mo2, Alleima® 13C26,

The size ranges appear on the graphs on page 12.

# Thin precision strip versatility

## Austenitic and duplex stainless steels

From mobile phone parts to printers, from electro-magnetic shielding gaskets to thermostat expansion bellows, Alleima thin precision strip plays a key role in multiple applications where tight thickness tolerances is essential. Our ability to achieve such tight tolerances is due to our cutting-edge cold rolling mills. In addition to our standard austenitic steels, we also offer a wide range of special grades with specific properties, such as non-magnetic, very high corrosion resistance and excellent formability.

## Martensitic stainless chromium steels

Found in pneumatic cylinders, photochemical machining and laser and waterjet cutting components, the Alleima Chromflex™ family of martensitic stainless chromium strip steels have a unique combination of very good

properties. Their tensile strength, shape, resistance to wear and fatigue strength are matched by good hardening and tempering properties, caused by a careful control of carbon to chromium proportion.

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#### ALLEIMA® GRADE

Austenitic And Duplex Stainless Steels And Ni-Base Alloys

Alleima® 12R11, Alleima® 11R51, Alleima® 13RM19, SAF™ 3207HD, Alleima® 9RU10, Nanoflex™, SAF™ 2507, Sanicro™ 75X

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#### Martensitic Stainless Chromium Steels

Chromflex™, Alleima® 6C27, Alleima® 12C27, Alleima® 10C28Mo2, Alleima® 14C28N

The size ranges appear on the graphs on page 12.



# Industrial blade applications

Our world-class metallurgy means we can produce strip steel with both optimum and consistent properties. This allows manufacturers to produce blades with excellent performance in various applications.

## Cold rolling precision

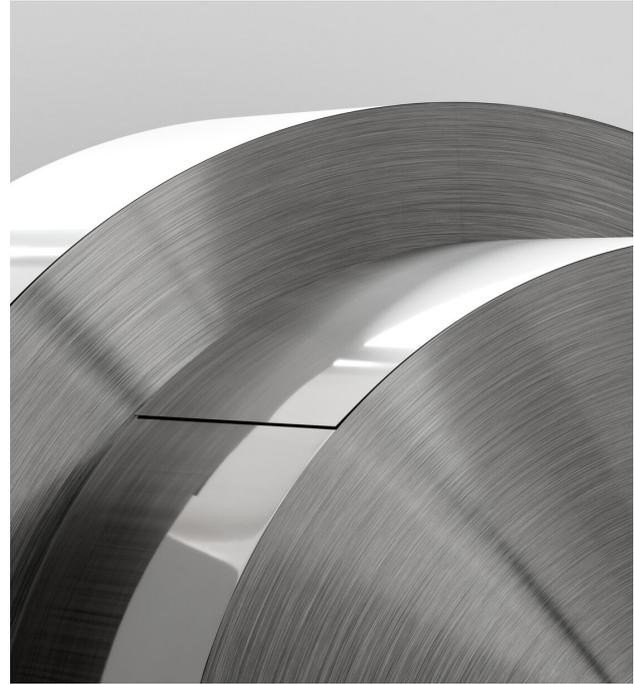
Alleima cold rolling mills produce strip steel with close thickness tolerances and excellent straightness. And to achieve the desired straightness, a perfect shape is produced in the strip.

## Optimal hardening

The final microstructure, mechanical properties and flatness of each strip product are perfected and set in the hardening and tempering process. In-line polishing also ensures optimal surface execution.

## Edge execution excellence

Smooth, problem-free manufacturing and perfect processing demands the highest standards in straightness, wear resistance, microstructure and strength. As edge execution plays a vital role here, we can tailor a variety of edges to fit your needs.



## Advancing the printing industry

Longer print life. Superior corrosion resistance. Alleima offers a wide product portfolio for printer doctor blades specifically designed for the industry's specialist needs.

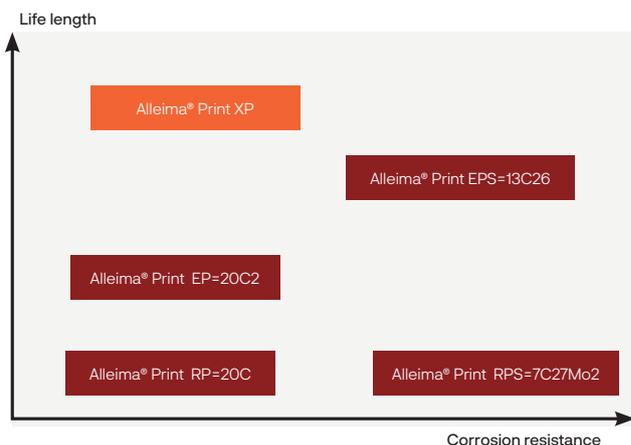
ALLEIMA®	TENSILE STRENGTH		WIDTH		THICKNESS	
	MPa	ksi	mm	inch	mm	inch
<b>Carbon Steels</b>						
Alleima® 20C	1600–2100	232–305	8–320	0.32–12.6	0.076–1.27	0.0030–0.05
Alleima® 20C2	1900–2100	276–305	8–320	0.32–12.6	0.102–0.305	0.0040–0.012
<b>Stainless Steels</b>						
Alleima® 7C27Mo2	1700–2000	247–290	8–340	0.08–14.2	0.076–1.5	0.0030–0.06
Alleima® 13C26	1800–2100	261–305	8–310	0.08–13.8	0.076–0.203	0.0030–0.0080
<b>Micro-alloyed steel</b>						
Alleima® Print XP	2250	327	8–320	0.32–12.6	0.076–0.305	0.0030–0.012

## For printing industry

To the printing industry Alleima® offers a wide product portfolio for doctor blades that matches the requirements of the segment.

## A complete portfolio

Whether it is long print life or corrosion resistance that customers require, Alleima® has doctor blade steels for every need.



# Surfaces

## Surface finish

To suit your needs, Alleima strip steel can be delivered in a range of surface finishes. Correct surface appearance descriptions refer to both appearance and roughness.

## Surface roughness

Surface roughness is measured with a bespoke trailing-stylus instrument. Relevant terminology and measuring methods can be found in EN ISO 4287 and EN ISO 4288.

### SURFACE ROUGHNESS

Class	Class Limit Ra, $\mu\text{m}$	Class Mean		
		$\mu\text{in.}$	Ra, $\mu\text{m}$	$\mu\text{in.}$
Y2	3.2–8	126–315	5.0	197
Y3	1.6–4	63–157	2.5	98
Y4	0.8–2	31–79	1.25	49
Y5	0.4–1	16–39	0.63	25
Y6	0.2–0.5	8–20	0.32	13
Y7	0.1–0.25	4–10	0.16	6
Y8	0.05–0.125	2–5	0.08	3

## Surface appearance

Surface appearance is defined in terms of brightness and color, as shown in the following table. As stainless steels are usually not color tempered these are not delivered in codes 6 and 7.

### SURFACE APPEARANCE

Code	Surface	Definition
0	No requirements	Normally an oxidized surface for which there are no appearance requirements.
2	Dull	Dull smooth surface.
3	Bright	Normal bright smooth surface.
4	Very bright	Mirror surface meeting very stringent requirements on uniform appearance.
6	Yellow	Yellow, oxidized surface with uniform color.
7	Blue	Blue, oxidized surface with uniform color.
8	White	Surface free from oxide discoloration and with uniform color.
9	Special	Surface as specified by customer.

# Edges

A wide range of edge finishes are available to serve the needs of your application. While edge finishes are dependent on application, the choice of finishes relies on steel grade, size and tolerance. Standard profiles are shown here, but other finishes, such as beveled edges, are also available.

## a) Mill edge

Untreated edge, generally with a somewhat uneven contour. No width tolerance is normally stated.

## b) Slit edge

Edge with the shearing burr left on. This edge is obtained by slitting with a circular shear.

## c) Deburred edge

Slit edge from which the burr has been removed.

## d) Square edge

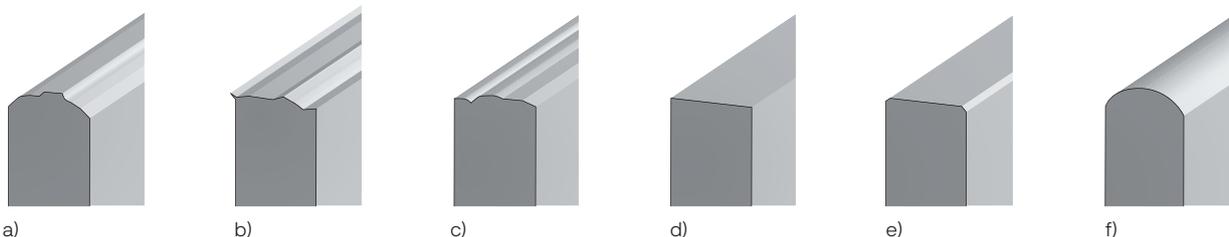
Sharp cornered square edge. Obtainable in widths up to 150 mm. Some hardened grades can be supplied with this edge in widths up to 430 mm.

## e) Square edge with rounded corners

Widths up to 150 mm.

## f) Round edge

Edge completely rounded. Obtainable in widths up to 150 mm.



# Shape

Dimensional accuracy matters. Alleima cold rolling mills use roll gap symmetry systems and automatic gauge control to ensure the precision you need.

Thickness, flatness and straightness are, typically, the most important characteristics for strip products.

Deviations from flatness could be in the form of waviness (such as edge waves or internal buckles), coil set and cross bow. Standards for deviations in coil set and cross bow according to different tolerances are shown in the table on this page.

Any deviations in shape characteristics are measured to guarantee the dimensions of the delivered products.

## Straightness

The diagram below shows how deviation from straightness is defined.

The values in the table show the deviation in straightness for a 1 meter length. To calculate deviations from straightness for other lengths can be determined with this formula:

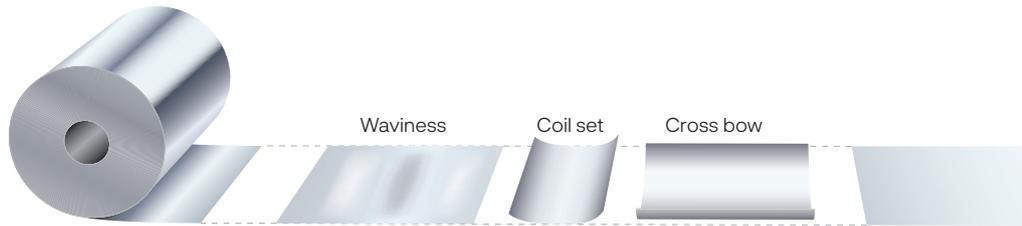
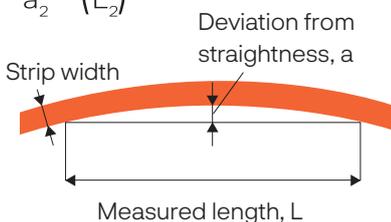
$a = b \times L^2$ , where

a = the required deviation from straightness in mm for a given length, in m.

b = deviation from straightness according to the table.

Conversion between two lengths,

$$\frac{a_1}{a_2} = \left(\frac{L_1}{L_2}\right)^2$$



TOLERANCE CLASS	CROSS BOW, % OF WIDTH	
	H/T condition	Cold rolled condition
P0	No requirements	No requirements
P1	0.4	0.6
P2	0.3	0.4
P3	0.2	0.3
P9	Acc. to requirements	Acc. to requirements

Hardened and tempered strip (H/T), in all tensile strengths and cold rolled strip in tensile strengths below 1100 MPa. Max. values for entire width range.

TOLERANCE CLASS	WIDTH < 20 mm (.8 in.)		WIDTH 20–≤50 mm (.8–≤2 in.)		WIDTH >50 mm (>2 in.)	
	Cross bow % of width	Coil set mm/300 mm (in./11.8 in.)	Cross bow % of width	Coil set mm/300 mm (in./11.8 in.)	Cross bow % of width	Coil set mm/300 mm (in./11.8 in.)
P1	0.6	35 (1.38)	0.8	35 (1.38)	–	35 (1.38)
P2	0.4	20 (0.79)	0.6	20 (0.79)	–	20 (0.79)
P3	0.3	10 (0.39)	0.4	10 (0.39)	–	10 (0.39)

Cold rolled condition in tensile strengths of 1100 MPa and above. Maximum values.

WIDTH MAX OUT-OF-STRAIGHTNESS, mm (in.). LENGTH 1 m (3 feet)

TOLERANCE CLASS 1)	R1	R2	R3	R4
mm (in.)				

## HARDENED AND TEMPERED CONDITION

All tensile strengths, MPa (ksi)

8–< 20 (0.31–0.79)	5 (0.2)	2 (0.079)	1.5 (0.059)	1 (0.039)
20–< 50 (0.79–1.97)	3.5 (0.14)	1.5 (0.059)	1 (0.039)	0.7 (0.028)
50–< 125 (1.97–4.92)	2.5 (0.098)	1.25 (0.049)	0.8 (0.031)	0.5 (0.02)
125– (4.92)	2 (0.079)	1 (0.039)	0.5 (0.02)	0.3 (0.02)

## COLD ROLLED CONDITION

Tensile strength < 1100 MPa

8–< 20 (0.31–0.79)	5 (0.2)	2 (0.079)	1.5 (0.059)	1 (0.039)
20–< 50 (0.79–1.97)	3.5 (0.14)	1.5 (0.059)	1 (0.039)	0.7 (0.028)
50–< 125 (1.97–4.92)	2.5 (0.098)	1.25 (0.049)	0.8 (0.031)	0.5 (0.02)
125– (4.92)	2 (0.079)	1 (0.039)	0.5 (0.02)	0.3 (0.02)

## TENSILE STRENGTH 1100–1800 MPa

–< 8 (– 0.31)	7 (0.28)	4 (0.16)	2.5 (0.098)	–
8–< 20 (0.31–0.79)	5 (0.2)	3 (0.12)	2 (0.079)	–
20–< 50 (0.79–1.97)	4 (0.16)	2.5 (0.098)	1.5 (0.059)	–
50–< 125 (1.97–4.92)	2.5 (0.098)	1.5 (0.06)	1.25 (0.049)	–
125– (4.92)	2 (0.079)	1 (0.039)	1 (0.039)	–

## TENSILE STRENGTH >1800 MPa

–< 8 (– 0.31)	8 (0.31)	5 (0.2)	3 (0.12)	–
8–< 20 (0.31–0.79)	6 (0.24)	4 (0.16)	2.5 (0.098)	–
20–< 50 (0.79–1.97)	5 (0.2)	3 (0.12)	2 (0.079)	–
50–< 125 (1.97–4.92)	3 (0.12)	2 (0.079)	1.5 (0.059)	–
125– (4.92)	2 (0.079)	1.5 (0.059)	1 (0.039)	–

1) R0 = no requirements

R9 = according to customer's specification

# Steel grades

ALLEIMA® GRADE	STANDARD	CHEMICAL COMPOSITION <sup>1)</sup>	TENSILE STRENGTH <sup>2)</sup>	DISTINGUISHING PROPERTY	EXAMPLES OF APPLICATIONS
		%	MPa (ksi) <sup>3)</sup>		
<b>Alloyed non-stainless steels and carbon steels</b>					
Alleima® 20C	ASTM 1095 W.-Nr. 1.1274 SS 1870	C 1.00 Si 0.3 Mn 0.4	H 1600–2100 (232–305)	Fatigue strength	Valves for compressors and shock absorbers, blanked and formed parts, springs, doctor blades
Alleima® 20C2	SS 2258	C 1.00 Si 0.3 Mn 0.3 Cr 1.4	H 1600–2100 (232–305)	Fatigue strength Wear resistance	Printing doctor blades
Alleima® Print XP		C 0.5 Cr 4.0 W 2.0 Mo 1.5	2250 (327)		Printing doctor blades
Alleima® 10C16Mo3V1		C 0.5 Cr 8.0 Mo 1.4 V 0.3	C 700–1000 (180–215)		Garden tools
<b>Martensitic stainless chromium steel</b>					
Alleima® 6C27	ASTM 420 EN 1.4028 W.-Nr. 1.4007 SS 2304	C 0.32 Cr 13.7	C 600–1000 (87–145) H 1500–1600 (218–232)		Components in electric shavers, crêping blades
Alleima® 7C27Mo2		C 0.38 Cr 13.5 Mo 1.0	C 700–1000 102-145 H 1700–2000 (247–290)	Fatigue strength	Compressor valves, components in electric shavers, print belts, meat saws, doctor blades, springs, surgical cutting tools
Alleima® 12C27M	EN (1.4034)	C 0.52 Cr 14.5	C 700–1000 (102–145)		Kitchen knives, scissors
Alleima® 12C27		C 0.60 Cr 13.5	C 700–1000 (102–145) H 1800–2100 (261–305)		Knives, scissors, skate blades
Alleima® 13C26		C 0.68 Cr 13	C 700–1100 (102–160) H 1800–2000 (261–290)		Razor blades, scalpels, industrial knives, doctor blades
Alleima® 19C27		C 0.95 Cr 13.5	C 700–1100 (102–160)		Industrial knives for plastic/synthetic fibres, paper etc.
Alleima® 14C28N		C 0.62 Cr 14 N 0.1	C 700–1100 H 1800–2000		Knives
Alleima® 10C28Mo2		C 0.53 Cr 14 Mo 1 N 0,08	C 700–1100 (102–160) H 1800–2000 (261–290)		Razor blades, knives, medical blades, industrial knives
Damax™		C 0.67 Si 0,4 Mn 0,6 Cr 13,5 Mo 0,5	700-1000 (102-145)		Made with up to 135 layers with martensitic stainless steel. Kitchen and outdoor knives, jewelry and decorative applications
Freeflex™		C 0.53 Si 0.40 Mn 0.65 Cr 14 Mo 0.95 Cu 0.70	2020 (293)		Compressor valves

## Alloyed non-stainless steels and carbon steels

When cold rolled, these steels have very good properties relating to forming, blanking and machining. Subsequent hardening and tempering makes these steels tough, resistant to wear and very suitable for use as springs and other applications demanding high strength.

<sup>1)</sup> Nominal value for main alloying elements.

<sup>2)</sup> C = cold rolled  
H = hardened and tempered

<sup>3)</sup>  $R_m$  1 MPa = 1 N/mm<sup>2</sup>

## Martensitic stainless chromium steels

These steels have excellent properties for forming and grinding sharp edges. After hardening and tempering, they also have good resistance to corrosion. Alleima 6C27, 7C27Mo2, 12C27 and 13C26 in hardened and tempered versions are supplied under the name Chromflex™. Here, special characteristics include good resistance to wear, high fatigue strength and very good flatness, plus uniform mechanical properties both along and across the rolling direction (isotropic properties).

Chromflex™, Damax™, Nanoflex™, Springflex™, SAF™ 2507 and Sanicro™ are trademarks owned by Alleima.

ALLEIMA® GRADE	STANDARD	CHEMICAL COMPOSITION <sup>1)</sup>	TENSILE STRENGTH <sup>2)</sup>	DISTINGUISHING PROPERTY	EXAMPLES OF APPLICATIONS
		%	MPa (ksi) <sup>3)</sup>		
Hiflex™		C 0.38 Si 0.4 Mn 0.55 Cr 13.5 Mo 1.0	1900 (275.5)		Compressor valves
Austenitic stainless steels					
Alleima® 12R11	ASTM (301) EN 1.4310 W.-Nr. 1.4310 SS 2331	C 0.10 Si 1.2 Cr 16.5 Ni 7	C 800–1900 (116–276)		Springs and other formed parts for e.g. diaphragms and electrical connectors
Alleima® 11R51	ASTM (301) EN 1.4310 W.-Nr. 1.4310 SS 2331	C 0.09 Si 1.2 Cr 16.5 Ni 7.5 Mo 0.7	C 1700–2050 (247–297)	Fatigue strength Relaxation resistance	Springs and other formed parts for e.g. hinges, thermostats and gaskets for electromagnetic shielding
Alleima® 13RM19	EN 1.4369	C 0.11 Mn 6.0 Cr 18.5 Ni 7 N 0.25	C 850–1600 (123–232)	Non-magnetic	Springs and other formed parts for non-magnetic applications
Alleima® 316LVM	ASTM F139 EN 1.4441 ISO 5832-1	Si 0.6 Mn 1.7 Cr 17.5 Ni 14 Mo 2.8	C 650–1300 (95–189)	Good corrosion resistance. Cleanliness of non metallic inclusions	Medical implants
Alleima® 2RK65HV	ASTM 904L EN 14539 SS 2562	C ≤0.02 Cr 20 Ni 25 Mo 4.5 Cu 1.5	650–1200 (94–174)	Very good corrosion resistance. Cleanliness of non metallic inclusions	Fine mechanical components.
Precipitation hardenable steels					
Alleima® 9RU10	ASTM 631 EN 1.4568 W.-Nr. 1.4568 SS 2388	C 0.08 Cr 16.5 Ni 7.5 Al 1.0	C 1200–1700 (174–247)	Tempering effect Relaxation resistance at elevated temperatures	Springs and parts with very complicated forms for e.g. hinges, couplings, washers and thermostats
Nanoflex™	UNS: S46910	C ≤0.02 Cr 12 Ni 9 Mo 4 Ti 0.9 Cu 2.0 Al 0.4	C 950–1850 (138–268)	Tempering effect Relaxation resistance at elevated temperatures Formability	Parts with very complicated forms for e.g. components in electric shavers
Duplex stainless steels (austenitic-ferritic)					
SAF™ 2507	UNS S32750 EN 1.4410	C ≤0.030 Cr 25 Ni 7 Mo 4	C 900–1600 (131–232)	Very high strength and stress corrosion cracking resistance in chloride containing environments	Springs e.g. in seawater service, marine environments, pulp and paper industry. Strip for welded tubes, cable and flexible tubing
Springflex™	EN 1.4462 UNS S32205, S31803	C ≤0.030 Cr 22 Ni 5.5 Mo 3.2	C 1100–1700 (160–239)	As above (SAF™ 2507)	As above (SAF™ 2507)
SAF™ 3207HD	UNS S33207	C ≤0.03 Cr 32 Ni 7 Mo 3.5	1000–1800	Excellent corrosion resistance	Springs e.g. in seawater service, marine environments, pulp and paper industry. Strip for welded tubes, cable and flexible tubing
Nickel-base alloy					
Sanicro® 75X	UNS N07750	C ≤0.020 Ni 72 Cr 16 Al 0.7 Nb 0.8	C 750–1350 (109–196)	Mechanical properties at elevated temperatures up to 800°C. Resistance to gas corrosion at high temperatures. Spring properties up to 600°C.	Positioner devices in nuclear power fuel assemblies. Springs and other parts exposed to high corrosive environment.  Low cobalt composition makes it especially suitable for nuclear applications

### Austenitic stainless steels

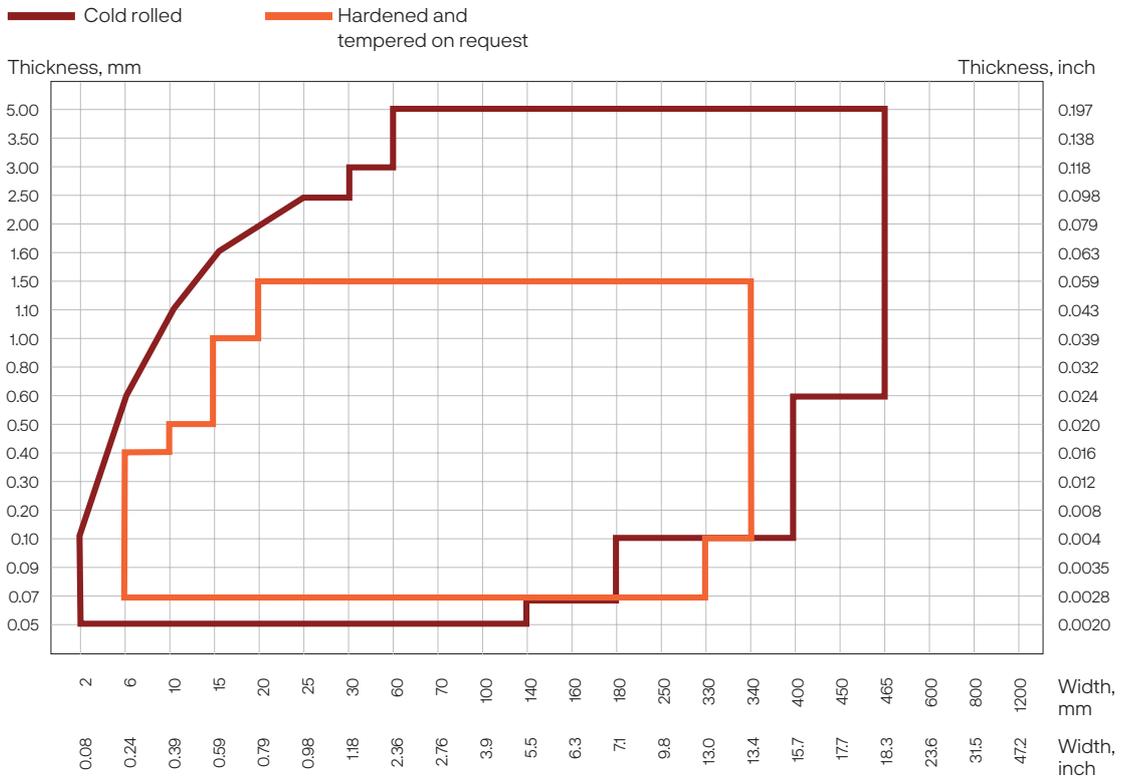
These steels have superior qualities in respect of resistance to corrosion combined with very good spring properties, low relaxation and high fatigue strength. The strength in these grades is achieved by cold rolling, which makes them available in a wide range of dimensions and mechanical properties. A further increase in strength can be obtained by a simple heat treatment in the temperature range 350–480°C depending on grade.

### Duplex stainless steels (austenitic-ferritic)

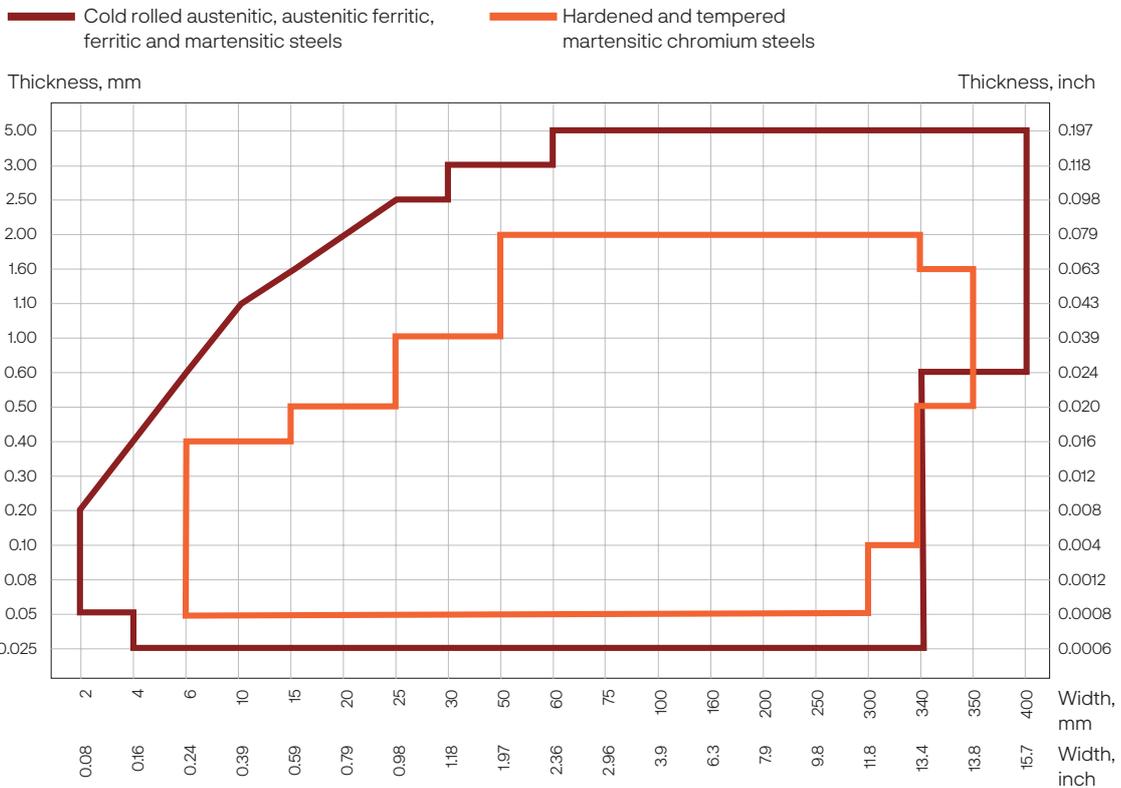
The modern duplex steels have excellent corrosion properties. They are not as sensitive to stress corrosion cracking as austenitic steels. Thermal expansion is lower than for austenitic steels, which can offer design advantages in certain cases.

# Sizes

## Alloyed non-stainless and carbon steels



## Stainless steel



# Size tolerances

In standard finishes, the tolerance is symmetrical: half above and half below the nominal size. Other tolerance dispositions can be made available. The nominal width tolerance class is B1, but slit strip can also be supplied

THICKNESS mm	WIDTH mm	THICKNESS TOLERANCE, mm ± TOLERANCE CLASS			
		T1	T2	T3	T4
<0.025	-250	0.003	0.002	0.0015	0.001
	>250-400	0.004	0.003	0.002	0.0015
0.025-<0.04	-250	0.004	0.003	0.002	0.0015
	>250-400	0.005	0.004	0.003	0.002
0.04-<0.063	-250	0.005	0.004	0.003	0.002
	>250-400	0.006	0.005	0.004	0.003
0.063-<0.1	-250	0.006	0.005	0.004	0.003
	>250-400	0.007	0.006	0.005	0.004
0.1-<0.125	-250	0.007	0.005	0.004	0.003
	>250-400	0.008	0.006	0.005	0.004
0.125-<0.16	-250	0.009	0.006	0.005	0.004
	>250-400	0.01	0.007	0.006	0.005
0.16-<0.2	-250	0.01	0.007	0.005	0.004
	>250-400	0.011	0.008	0.006	0.005
0.2-<0.25	-250	0.011	0.008	0.006	0.004
	>250-400	0.013	0.009	0.007	0.006
	>400-600	0.014	0.010	0.008	0.007
0.25-<0.315	-250	0.013	0.009	0.007	0.005
	>250-400	0.015	0.011	0.008	0.006
	>400-600	0.017	0.012	0.009	0.007
0.315-<0.4	-250	0.015	0.011	0.008	0.006
	>250-400	0.017	0.012	0.009	0.006
	>400-600	0.020	0.014	0.010	0.008
0.4-<0.5	-250	0.017	0.012	0.009	0.006
	>250-400	0.020	0.014	0.010	0.007
	>400-600	0.023	0.017	0.012	0.009
0.5-<0.63	-250	0.020	0.014	0.010	0.007
	>250-400	0.024	0.017	0.012	0.009
	>400-600	0.028	0.020	0.014	0.010
0.63-<0.8	-250	0.023	0.017	0.012	0.008
	>250-400	0.027	0.020	0.014	0.010
	>400-600	0.032	0.023	0.016	0.012
0.8- <1	-250	0.027	0.019	0.013	0.009
	>250-400	0.032	0.023	0.016	0.012
	>400-600	0.037	0.027	0.019	0.014
1-<1.25	-250	0.034	0.024	0.017	0.012
	>250-400	0.036	0.026	0.018	0.013
	>400-600	0.042	0.029	0.021	0.015
1.25-<1.6	-250	0.039	0.028	0.020	0.014
	>250-400	0.044	0.032	0.022	0.016
	>400-600	0.050	0.038	0.026	0.019
1.6-<2	-250	0.046	0.033	0.023	0.017
	>250-400	0.050	0.038	0.026	0.019
	>400-600	0.060	0.042	0.029	0.021
2-<2.5	-250	0.050	0.035	0.025	0.017
	>250-400	0.055	0.040	0.028	0.020
	>400-600	0.065	0.050	0.033	0.024
2.5-<3.15	-250	0.056	0.040	0.028	0.020
	>250-400	0.060	0.043	0.030	0.022
	>400-600	0.070	0.050	0.035	0.025
3.15-5	-250	0.063	0.045	0.032	0.022
	>250-400	0.065	0.050	0.034	0.024
	>400-600	0.080	0.060	0.040	0.029

with B2 or B3 tolerances. Closer tolerances require special edge treatment. Other width tolerances for austenitic and duplex stainless steels are applicable according to EN 10258.

THICKNESS mm	WIDTH mm	WIDTH TOLERANCE, mm ± TOLERANCE CLASS				
		B1	B2	B3	B4	
<0.25	-<	20	0.07	0.05	0.03	0.02
	20-<	50	0.10	0.07	0.05	0.035
	50-<	125	0.15	0.11	0.07	0.05
	125-<	250	0.20	0.15	0.10	0.07
0.25-<0.50	250-<	400	0.30	0.20	0.15	0.10
	400-<	600	0.40	0.30	0.20	-
	600-<	800	0.60	0.40	0.30	-
	-<	20	0.10	0.07	0.05	0.03
0.50-<1.00	20-<	50	0.15	0.11	0.07	0.05
	50-<	125	0.20	0.15	0.10	0.07
	125-<	250	0.25	0.20	0.15	0.10
	250-<	400	0.35	0.30	0.20	0.15
1.00-<1.60	400-<	600	0.50	0.35	0.25	-
	600-<	800	0.70	0.50	0.35	-
	-<	20	0.15	0.11	0.07	0.05
	20-<	50	0.20	0.15	0.10	0.07
1.60-<2.00	50-<	125	0.25	0.20	0.15	0.10
	125-<	250	0.35	0.25	0.20	0.15
	250-<	400	0.45	0.35	0.25	0.20
	400-<	600	0.70	0.50	0.35	-
2.00-<2.50	600-<	800	0.90	0.60	0.40	-
	-<	20	0.25	0.20	0.15	0.10
	20-<	50	0.30	0.20	0.15	0.10
	50-<	125	0.35	0.30	0.20	0.15
2.50-<4.00	125-<	250	0.40	0.30	0.20	0.15
	250-<	400	0.50	0.35	0.25	0.20
	400-<	600	0.70	0.50	0.35	-
	600-<	800	0.90	0.60	0.40	-
	-<	20	-	-	-	-
	20-<	50	0.40	0.30	0.20	0.15
	50-<	125	0.45	0.30	0.20	0.15
	125-<	250	0.50	0.35	0.25	0.20
	250-<	400	0.60	0.40	0.30	0.25
	400-<	600	0.80	0.60	0.40	-
	600-<	800	1.00	0.70	0.50	-
	-<	20	-	-	-	-

If required thicknesses 4 mm and above can be discussed.

THICKNESS inch	WIDTH inch	THICKNESS TOLERANCE, inch ± TOLERANCE CLASS			
		T1	T2	T3	T4
-<.0010	-9.8	.00012	.00008	.00006	.00004
	>9.8-15.7	.00016	.00012	.00008	.00006
.0010-	-9.8	.00016	.00012	.00008	.00006
<.0016	>9.8-15.7	.00020	.00016	.00012	.00008
.0016-	-9.8	.00020	.00016	.00012	.00008
<.0025	>9.8-15.7	.00024	.00020	.00016	.00012
.0025-	-9.8	.00024	.00020	.00016	.0001
<.0039	>9.8-15.7	.00028	.00024	.00020	.00016
.0039-	-9.8	.00028	.00020	.00016	.00012
<.0049	>9.8-15.7	.00031	.00024	.00020	.00016
.0049-	-9.8	.00035	.00024	.00020	.00016
<.0063	>9.8-15.7	.00039	.00028	.00024	.00020
.0063-	-9.8	.00039	.00028	.00020	.00016
<.0079	>9.8-15.7	.00043	.00031	.00024	.00020
.0079-	-9.8	.00043	.00031	.00024	.00016
<.0098	>9.8-15.7	.00051	.00035	.00028	.00024
	>15.7- 23.6	.00055	.00039	.00031	.00028
.0098-	-9.8	.00051	.00035	.00028	.00020
<.0124	>9.8-15.7	.00059	.00043	.00031	.00024
	>15.7- 23.6	.00067	.00047	.00035	.00028
.0124-	-9.8	.00059	.00043	.00031	.00024
<.0157	>9.8-15.7	.00067	.00047	.00035	.00024
	>15.7- 23.6	.00079	.00055	.00039	.00031
.0157-	-9.8	.00067	.00047	.00035	.00024
<.0197	>9.8-15.7	.00079	.00055	.00039	.00028
	>15.7- 23.6	.00091	.00067	.00047	.00035
.0197-	-9.8	.00079	.00055	.00039	.00028
<.0248	>9.8-15.7	.00094	.00067	.00047	.00035
	>15.7- 23.6	.00110	.00079	.00055	.00039
.0248-	-9.8	.00091	.00067	.00047	.00031
<.0315	>9.8-15.7	.00106	.00079	.00055	.00039
	>15.7- 23.6	.00126	.00091	.00063	.00047
.0315-	-9.8	.00106	.00075	.00051	.00035
<.0394	>9.8-15.7	.00126	.00091	.00063	.00047
	>15.7- 23.6	.00146	.00106	.00075	.00055
.0394-	-9.8	.00134	.00094	.00067	.00047
<.0492	>9.8-15.7	.00142	.00102	.00071	.00051
	>15.7- 23.6	.00165	.00114	.00083	.00059
.0492-	-9.8	.00153	.00110	.00079	.00055
<.0630	>9.8-15.7	.00173	.00126	.00087	.00063
	>15.7- 23.6	.00197	.00150	.00102	.00075
.0630-	-9.8	.00181	.00130	.00091	.00067
<.0787	>9.8-15.7	.00197	.00150	.00102	.00075
	>15.7- 23.6	.00236	.00165	.00114	.00083
.0787-	-9.8	.00197	.00138	.00098	.00067
<.0984	>9.8-15.7	.00216	.00157	.00110	.00079
	>15.7- 23.6	.00256	.00197	.00130	.00094
.0984-	-9.8	.00220	.00157	.00110	.00079
<.1240	>9.8-15.7	.00236	.00169	.00018	.00087
	>15.7- 23.6	.00276	.00197	.00138	.00098
.1240-	-9.8	.00248	.00177	.00126	.00087
<.1969	>9.8-15.7	.00256	.00197	.00134	.00094
	>15.7- 23.6	.00315	.00236	.00157	.00114

THICKNESS inch	WIDTH inch	WIDTH TOLERANCE, inch ± TOLERANCE CLASS				
		B1	B2	B3	B4	
-<.0098	-<	20	.0028	.0020	.0012	.0008
	20-<	50	.0039	.0028	.0020	.0014
	50-<	125	.0059	.0043	.0028	.0020
	125-<	250	.0079	.0059	.0039	.0028
	250-<	400	.0118	.0079	.0059	.0039
	400-<	600	.0157	.0118	.0079	-
	600-<	800	.0236	.0157	.0118	-
.0098-<.0197	-<	20	.0039	.0028	.0020	.0012
	20-<	50	.0059	.0043	.0028	.0020
	50-<	125	.0079	.0059	.0039	.0028
	125-<	250	.0098	.0079	.0059	.0039
	250-<	400	.0138	.0118	.0079	.0059
	400-<	600	.0197	.0138	.0098	-
	600-<	800	.0276	.0197	.0138	-
.0197-<.0394	-<	20	.0059	.0043	.0028	.0020
	20-<	50	.0079	.0059	.0039	.0028
	50-<	125	.0098	.0079	.0059	.0039
	125-<	250	.0118	.0098	.0059	.0039
	250-<	400	.0157	.0118	.0079	.0059
	400-<	600	.0236	.0157	.0118	-
	600-<	800	.0315	.0236	.0157	-
.0394-<.0630	-<	20	.0079	.0059	.0039	.0028
	20-<	50	.0098	.0079	.0059	.0039
	50-<	125	.0118	.0098	.0059	.0039
	125-<	250	.0138	.0098	.0079	.0059
	250-<	400	.0177	.0138	.0098	.0079
	400-<	600	.0276	.0197	.0138	-
	600-<	800	.0354	.0236	.0157	-
.0630-<.0787	-<	20	.0098	.0079	.0059	.0039
	20-<	50	.0118	.0079	.0059	.0039
	50-<	125	.0138	.0118	.0079	.0059
	125-<	250	.0157	.0118	.0079	.0059
	250-<	400	.0197	.0138	.0098	.0079
	400-<	600	.0276	.0197	.0138	-
	600-<	800	.0354	.0236	.0157	-
.0787-<.0984	-<	20	.0138	.0098	.0079	.0059
	20-<	50	.0138	.0098	.0079	.0059
	50-<	125	.0157	.0118	.0079	.0059
	125-<	250	.0177	.0138	.0098	.0079
	250-<	400	.0217	.0157	.0118	.0098
	400-<	600	.0315	.0236	.0157	-
	600-<	800	.0394	.0276	.0197	-
.0984-<.1575	-<	20	-	-	-	-
	20-<	50	.0157	.0118	.0079	.0059
	50-<	125	.0177	.0118	.0079	.0059
	125-<	250	.0197	.0138	.0098	.0079
	250-<	400	.0236	.0157	.0118	.0098
	400-<	600	.0315	.0236	.0157	-
	600-<	800	.0394	.0276	.0197	-

If required thicknesses 0,16 inch and above can be discussed.

## Forms of supply

Alleima strip steel can be delivered as:

- Coils: widths 12 mm and wider
- Pancake coils: less than 12 mm wide
- Bundles oscillated with welded strands
- Plastic spools oscillated with welded strands
- Cut lengths

Interleaving paper protects materials with very high quality surfaces. Especially thin strip is supplied on plastic or cardboard core. And for additional protective measures, anti-corrosive paper can also be used for packing. The packaging guide on our website gives further useful information about packing and protection.



## Global availability, local accessibility

**Prompt, effective communication. Global availability. A seamless network of integrated sales, stock control, support and distribution. Partnering with Alleima means partnering with efficiency.**

Top delivery performance is our aim. Thanks to a range of stock locations, many orders can be fulfilled immediately. Where products need to be manufactured, efficiencies in lead times means availability is continuously being improved.

With over 5000 colleagues in five different continents, Alleima brings you global excellence, accessible locally.



